

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

IN THE CLAIMS:

1. (Currently Amended) A method of making an interconnect structure comprising the steps of:

depositing a titanium layer on an interconnect structure having one or more contact openings which expose one or more silicide regions;

subjecting said deposited titanium layer to an in-situ plasma nitridization process;

depositing at least one layer of titanium nitride on said in-situ plasma-treated titanium layer by thermally decomposing a titanium-containing precursor and a nitrogen-containing precursor; and

filling said contact openings with tungsten.

2. (Original) The method of claim 1 wherein the silicide of said silicide regions is comprised of silicon and a metal selected from the group consisting of cobalt, nickel, titanium, tungsten, platinum and molybdenum.

3. (Original) The method of claim 2 wherein said silicide is comprised of a nickel silicide.

4. (Original) The method of claim 2 wherein said silicide is comprised of a cobalt silicide.

5. (Original) The method of claim 2 wherein said silicide is comprised of a titanium silicide.
6. (Original) The method of claim 1 wherein prior to depositing said titanium layer on said interconnect structure, said interconnect structure undergoes surface cleaning.
7. (Original) The method of claim 1 wherein said titanium layer is deposited on said silicon substrate by a physical vapor deposition process.
8. (Original) The method of claim 1 wherein said titanium layer has a thickness of between about 25Å to about 250Å.
9. (Original) The method of claim 1 wherein said in-situ plasma nitridization process comprises converting all free titanium into titanium nitride in a hydrogen and nitrogen gas environment.
10. (Original) The method of claim 1 wherein said in-situ plasma nitridization process is performed at a temperature from between about room temperature to about 410°C.
11. (Currently Amended) The method of claim ~~[[11]]~~ 10 wherein said in-situ plasma nitridization process is performed at a temperature from between about 325°C to about 400°C.

12. (Currently Amended) The method of claim ~~[[12]]~~ 11 wherein said in-situ plasma nitridization process is performed at a temperature of about 350°C.
13. (Original) The method of claim 1 wherein said in-situ plasma nitridization process is performed for a period of from between about 5 to about 60 seconds.
14. (Original) The method of claim 13 wherein said in-situ plasma nitridization process is performed for a period of from between about 5 to about 45 seconds.
15. (Original) The method of claim 14 wherein said in-situ plasma nitridization process is performed for a period of about 25 seconds.
16. (Canceled)
17. (Currently Amended) The method of claim ~~[[16]]~~ 1 wherein said ~~CVD process~~ involves using a titanium-containing precursor selected from the group consisting of TDMAT, TDEAT and titanium tetrachloride.
18. (Currently Amended) The method of claim ~~[[16]]~~ 1 wherein said ~~CVD process~~ involves using a nitrogen-containing precursor ~~[[of]]~~ is ammonia.
19. (Original) The method of claim 1 wherein each of said at least one titanium nitride layer has a thickness of between about 15Å to about 100Å.

20. (Original) The method of claim 1 wherein at least two layers of titanium nitride are deposited on said in-situ plasma-treated titanium layer.

21. (Canceled)

22. (Canceled)

23. (Currently Amended) A semiconductor device having a silicide contact, comprising an interconnect structure having one or more contact openings which expose one or more silicide regions;
a low thermal budget MOL liner formed above said silicide contact, said liner comprising a titanium-deposited layer that has been subjected to an in-situ gas plasma nitridization process; and
one or more titanium nitride layers deposited on said low thermal budget MOL liner by thermally decomposing a titanium-containing precursor and a nitrogen-containing precursor.

24. (Original) The semiconductor device of claim 23 wherein said silicide contact is comprised of silicon and a metal selected from the group consisting of cobalt, nickel, titanium, tungsten, platinum and molybdenum.

25. (Original) The semiconductor device of claim 24 wherein said silicide contact is comprised of a nickel silicide.
26. (Original) The semiconductor device of claim 24 wherein said silicide is comprised of a cobalt silicide.
27. (Original) The semiconductor device of claim 23 wherein said titanium-deposited layer has a thickness of between about 25Å to about 250Å.
28. (Original) The semiconductor device of claim 23 wherein each of said one or more titanium nitride layers has a thickness of between about 15Å to about 100Å.
29. (Original) The semiconductor device of claim 23 wherein said semiconductor device is subjected to a bulk tungsten filling step.
30. (Original) The semiconductor device of claim 29 wherein said bulk tungsten filling step is performed by a CVD process.